

BASIS FOR THE AMENDMENT

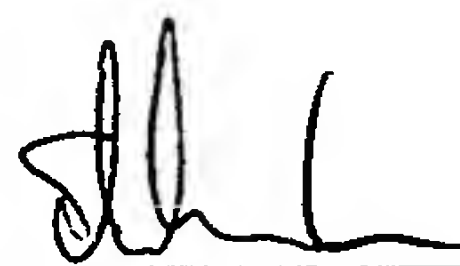
Claims 1-10, 12-14, and 16-31 are active in the present application. Claims 11 and 15 are canceled claims. Claims 30 and 31 are new claims. Support for new Claims 30 and 31 is found in previously presented Claim 3 and in the specification on page 7, lines 25-32. No new matter is added.

REMARKS

Applicants thank Examiner Toomer for the helpful and courteous discussion of October 31, 2005. The present Supplemental Amendment adds new dependent Claims 30 and 31. The new dependent claims require that the adduct mixture obtained from the process of Claim 1 contains a certain phenolic compound encompassed by previously presented Claim 3.

Respectfully submitted,

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Fluid technologies for a better world™



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European Patent Office
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Germany

18 August 2005

Dear Sir,

Opposition by Lubrizol Limited to EP 1 226 188 B1 (Application Number
00971319.9)

Our Reference: LO 236

I enclose EPO Forms 2300 and 1010 in respect of Lubrizol Limited filing a notice of opposition against the above granted patent.

I am an employee of the Applicant, Lubrizol Limited, and hereby appoint myself as the representative. I have already been authorised to act for Lubrizol Limited under authorisation no. 46412.

Payment of the opposition fee will be made by The Lubrizol Corporation via their deposit account with the European Patent Office.

With regard to document D2 (declaration by John McMahon), only a copy of this document is included in this notice of opposition. The original copy was filed in November 2004 (when submitted as a document in an opposition



Responsible Care

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submitted by Lubrizol Limited against EP1233990 (or Application Number 00969422.5)).

Enclosed with this letter are the documents stated below.

I trust that this is in order, but if you have any queries, please contact me immediately.

Yours faithfully

LUBRIZOL LIMITED

A handwritten signature in black ink, appearing to read 'William A. T. Ellyatt', with a long horizontal flourish extending to the right.

William A. T. Ellyatt

(GA 46412)

Enc. EPO Form 2300

EPO Form 1010

Facts and Arguments in Support of the Opposition

D1 – WO 00/78898 A1

D2 – Declaration by John McMahon

D3 – CA 2,089,833

D4 – US 5,300,701

D5 – Pilot Plant Procedure

D6 – BP Chemicals Press Cuttings

D7 – BP Chemicals Press Release

D8 – EP 0831 141 A

D9 – Principles of Organic Synthesis, Third Edition, Edited by R. O. C. Norman and J. M. Coxon, pages 261 to 264.

D10 – Advanced Organic Chemistry, Reactions, Mechanism and Structure, Fourth Edition, Edited by Jerry March, Page 900.

D11 – Ultravis®10 Technigram

EP 1 226 188 B1 (Application Number 00971319.9)

Proprietor: BASF Aktiengesellschaft

Opposition by Lubrizol Limited

Our Reference: LO 236

Facts and Arguments in Support of the Opposition

I - The Claims of the Granted Patent

1. A process for the preparation of polyisobutenylphenol-containing Mannich adducts by

a) alkylation of phenol with polyisobutene having more than 70 mol% of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below 50 °C in the presence of an alkylation catalyst;

b) reaction of the reaction product from a) with

formaldehyde, an oligomer or a polymer of formaldehyde and

at least one amine which has at least one secondary amino function and no primary amino function or

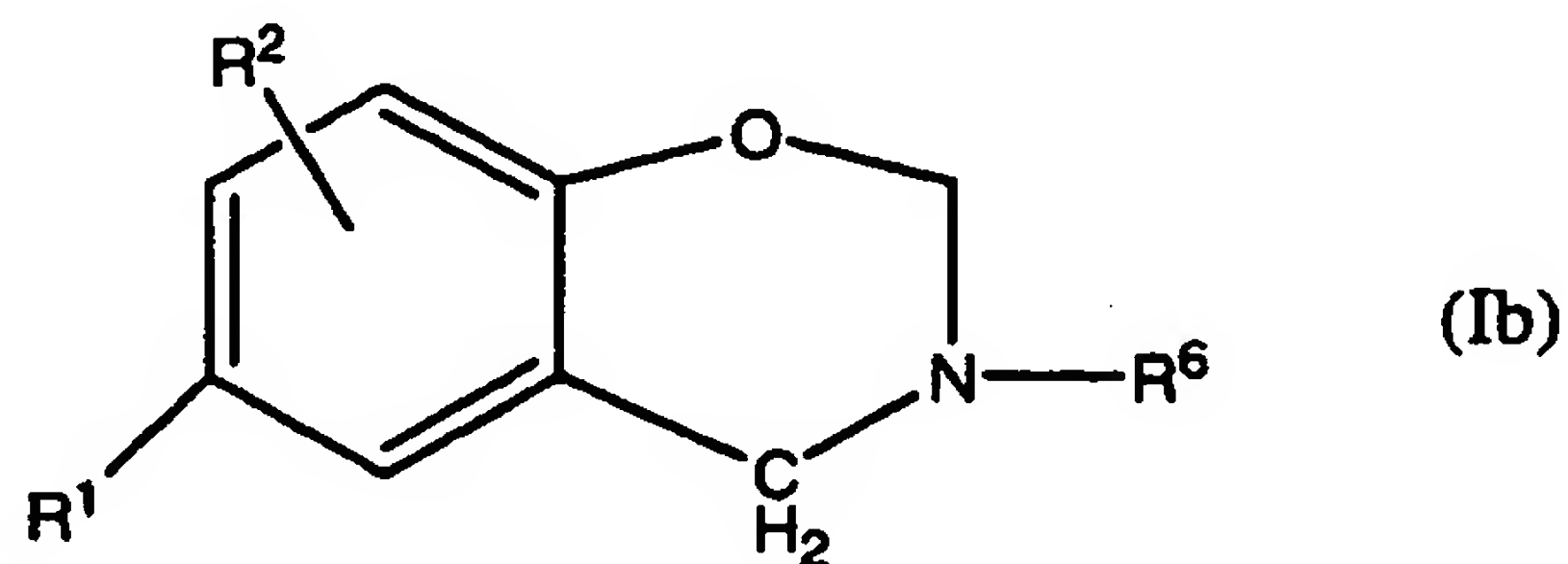
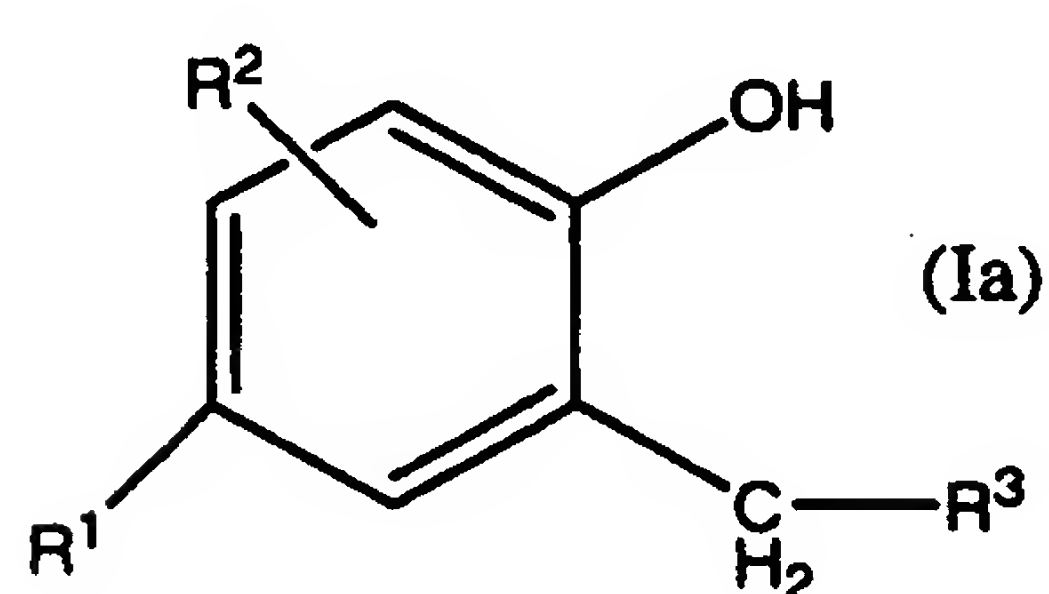
c) reaction of the reaction product from a) with at least one adduct of at least one amine which has at least one secondary or primary amino function and formaldehyde, an oligomer of formaldehyde, a polymer of formaldehyde or a formaldehyde equivalent.

2. A process as claimed in claim 1, wherein the amine used is 3-(dimethylamino)-n-propylamine, di[3-(dimethylamino)-n-propyl]amine, dimethylamine, diethylamine, di-n-propylamine or morpholine.

3. A process as claimed in claim 1, wherein, in step c), the adduct used is an aminal of formaldehyde with a secondary amine, selected from di-C₁-C₈-alkylamines

whose alkyl groups may be substituted by an $N(C_1-C_4\text{-alkyl})_2$ group, and cyclic amines, which have 4 to 6 carbon atoms and whose cyclic structure may be interrupted by O and/or $N-C_1-C_4\text{-alkyl}$.

4. A process as claimed in any of the preceding claims, wherein an adduct mixture is obtained which comprises at least 40 mol % of compounds of the formula Ia and/or Ib,



where

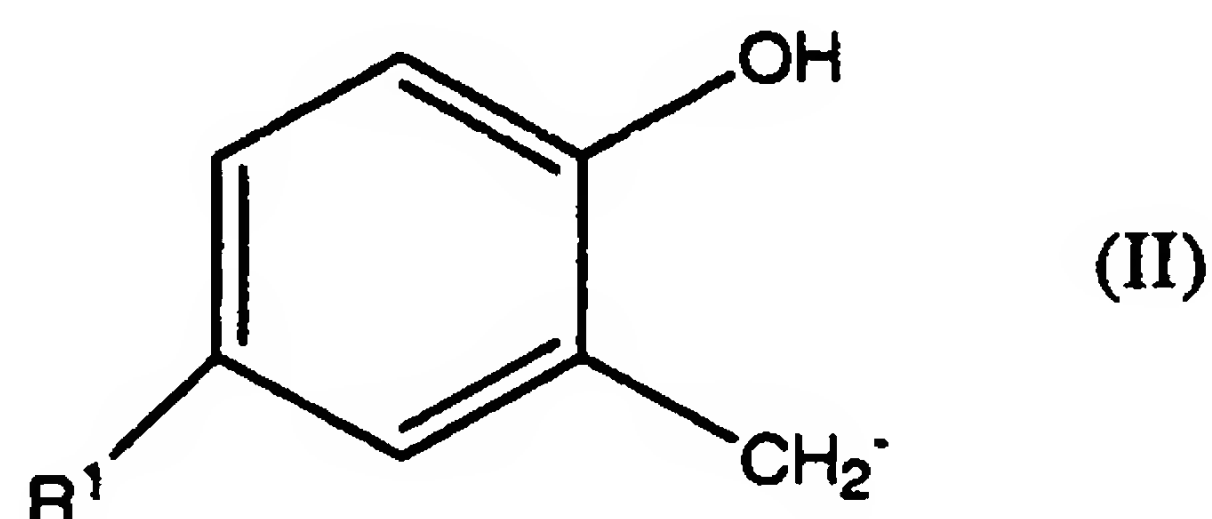
R^1 is a terminally bonded polyisobutenyl radical,

R^2 is H, C_1 - to C_{20} -alkyl, C_1 - to C_{20} -alkoxy, hydroxyl, a polyalkylenyl radical or $CH_2NR^4R^5$, where R^4 and R^5 have the meanings stated below, and

R^3 is NR^4R^5 , where R^4 and R^5 , independently of one another, are selected from H, C_1 - to C_{20} -alkyl, C_3 - to C_8 -cycloalkyl and C_1 - to C_{20} -alkoxy radicals

which may be interrupted by heteroatoms selected from

N and O, and phenol radicals of the formula II



where R^1 and R^2 are as defined above;

with the proviso that R^4 and R^5 are not simultaneously H or phenol radicals of the formula II; or R^4 and R^5 , together with the N atom to which they are bonded, form a 5-, 6- or 7-membered cyclic structure which has one or two heteroatoms selected

from N and O and may be substituted by one, two or three C¹- to C⁶-alkyl radicals;
and

R⁶ is a radical R⁴ or R⁵ other than H.

5. A process as claimed in any of the preceding claims, wherein a Mannich adduct having a polydispersity of from 1.1 to 3.5 is obtained.

6. A process as claimed in any of the preceding claims, wherein, in step c), an adduct which is obtained from at least one amine and formaldehyde, an oligomers of formaldehyde, a polymer of formaldehyde or a formaldehyde equivalent by reacting the two reactants for at least 15 minutes at above +15 °C is used.

7. A process as claimed in any of claims 1 to 6, wherein the reaction mixture from b) or c) is fractionated by column chromatography over an acidic stationary phase by multistage elution with

- at least one hydrocarbon and then
- at least one basic alcohol/water mixture.

8. A process as claimed in claim 7, wherein the basic alcohol/water mixture used is a mixture of

- a) from 75 to 99.5% by weight of at least one C₂- to C₄-alcohol,
- b) from 0.4 to 24.4% by weight of water and
- c) from 0.1 to 15% by weight of at least one amine which is volatile at room temperature.

9. A process as claimed in any of the preceding claims, wherein the adduct mixture obtained includes from 0 to 20, preferably 1 to 15 mol% of polyisobutenylphenols from reaction step a) which are not reacted further.

10. A Mannich adduct obtainable by

a) alkylation of phenol with polyisobutene having more than 70 mol% of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below 50 °C in the presence of an alkylation catalyst;

b) reaction of the reaction product from a) with formaldehyde, an oligomer or a polymer of formaldehyde and at least one amine which has at least one secondary amino function and no primary amino function.

11. The use of a Mannich adduct as claimed in claim 10 as a detergent additive in fuel and lubricant compositions.

12. An additive concentrate containing, in addition to conventional additive components, at least one Mannich adduct as claimed in claim 10 in amounts from 0.1 to 99.9% by weight, preferably 0.5 to 80% by weight.

13. A fuel composition containing a main amount of a liquid hydrocarbon fuel and an amount, having detergent activity, of at least one adduct as claimed in claim 10.

14. A lubricant composition containing a main amount of a liquid, semisolid or solid lubricant and an amount, having detergent activity, of at least one adduct as claimed in claim 10.

15. The use of a fuel composition as claimed in claim 13 as a gasoline or diesel fuel.

EP 1 226 188 B1 (Application Number 00971319.9)

Proprietor: BASF Aktiengesellschaft

Opposition by Lubrizol Limited

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Facts and Arguments in Support of the Opposition

I - The Claims of the Granted Patent

1. A process for the preparation of polyisobutenylphenol-containing Mannich adducts by

a) alkylation of phenol with polyisobutene having more than 70 mol% of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below 50 °C in the presence of an alkylation catalyst;

b) reaction of the reaction product from a) with

formaldehyde, an oligomer or a polymer of formaldehyde and

at least one amine which has at least one secondary amino function and no primary amino function or

c) reaction of the reaction product from a) with at least one adduct of at least one amine which has at least one secondary or primary amino function and formaldehyde, an oligomer of formaldehyde, a polymer of formaldehyde or a formaldehyde equivalent.

2. A process as claimed in claim 1, wherein the amine used is 3-(dimethylamino)-n-propylamine, di[3-(dimethylamino)-n-propyl]amine, dimethylamine, diethylamine, di-n-propylamine or morpholine.

3. A process as claimed in claim 1, wherein, in step c), the adduct used is an amination of formaldehyde with a secondary amine, selected from di-C₁-C₈-alkylamines

to include dimethylamine (7th last line) or morpholine (4th last line). Therefore, D4 anticipates claim 2 of the Opposed Patent.

6. Claim 4 of the Opposed Patent is anticipated by D1 because the adduct disclosed is obtained by a Mannich reaction using a compound defined in formula (Ia) wherein R¹ is a terminally bonded polyisobutenyl radical. Since the high reactive polyisobutylene of D1 contains as least 70 % of terminal olefinic double bonds (page 2, lines 35 to 36) and these predominately react at the para position relative to the hydroxyl group of phenol D1 inherently has the same adduct.

7. Claim 5 of the Opposed Patent is anticipated by D1 because the Mannich product will have an adduct inherently with a polydispersity between 1.1 and 3.5 because Ultravis@10 is less than 1.8 and typically 1.6 (confirmed in D2). Therefore, D1 discloses the subject matter of claim 5 of the Opposed Patent.

8. Claim 10 of the Opposed Patent is anticipated by D1 because of the same arguments as paragraph 4 and the teaching on Page 6 disclosing dimethylamine (7th last line) as a suitable amine.

9. Claim 11 of the Opposed Patent is anticipated by D1 because the Mannich product of D1 is suitable for fuel compositions (page 1, Technical Field; and page 9, last paragraph to page 10, first paragraph).

10. Claims 12, 13 and 15 of the Opposed Patent are anticipated by D1 because the Mannich product of D1 (see page 10, second paragraph) has detergent properties and is suitable for fuel compositions with a treat rate of 10 to 1000 part per million (equivalent of up to 0.1 wt %). Furthermore the fuel may be either diesel or gasoline.

11. Therefore, D1 clearly discloses in the highlighted sections a polyisobutenylphenol-containing Mannich within the scope of for claims 1-5, 10-13 and 15 because the highly reactive polyisobutene of D1 meets the parameters of component (a) of the Opposed Patent and the alkylation is conducted within the claimed conditions. Furthermore, D1 discloses in the highlighted sections, the amines of the Opposed Patent. Accordingly, D1 discloses the subject matter of claims of

claims 1-4 and 8-13 and 15 of the Opposed Patent. Hence, the Opposed Patent lacks novelty over D1.

III - Lack of Inventive Step (Article 56 EPC)

12. In the alternative claims 1 to 15 of the Opposed Patent lack an inventive step in view of D3 used in combination with D4, or D3 in combination with D6 (or D7), or D8 in combination with D9. With regard to the combinations of D3 with D4; and D3 in combination with D6 (or D7), EPO Case law T94/84 (section 8 to 8.3 of the reasons for the decision) describes the same situation. In that case, the Opposition Board were of the opinion that there was no inventive step because the invention of that case involved an obvious replacement of a component in view of a general trend to do so.

D3 used in combination with D4

13. D3 discloses on page 1, lines 5 to 18 fuel compositions which reduce or eliminate valve deposits in engine equipment. The composition of D3 comprises gasoline and a condensation product of (1) a high molecular weight sulfur-free alkyl-substituted hydroxyaromatic compound with a number average molecular weight of 600 to 3000, (2) an amino group having at least one active hydrogen, and (3) an aldehyde in ratio 1: 0.1-10: 0.1-10 (page 5, lines 20 to 28).

14. D3 teaches a particularly preferred list of amines specifically disclosed as being dimethylamine, dimethylaminopropylamine, tetraethylenepentamine, triethylenetetramine, diethylenetriamine and mixtures thereof (page 6, lines 8 to 11). All of the preferred amines of D3 have (i) at least one secondary amino function and no primary amino function, or (ii) form with an aldehyde an adduct with at least one adduct of at least one amine which has at least one secondary or primary amino function.

15. Additionally, the aldehyde of D3 is preferably formaldehyde, paraformaldehyde and admixtures thereof (page 6, lines 12 to 14). A suitable high molecular weight sulfur-free alkyl group is disclosed as being a polyisobutenyl (see page 11, line 4). Therefore D3 discloses a condensation product of (1) a high

molecular weight sulfur-free alkyl-substituted hydroxyaromatic compound with a number average molecular weight of 600 to 3000, (2) an amino group having at least one active hydrogen, and (3) an aldehyde in ratio 1: 0.1-10: 0.1-10, wherein (1) contains a polyisobutenyl alkyl group substituted on a phenol and reacted with (2) an amine chosen from a small list of amines and (3) formaldehyde. Furthermore the only difference between the Mannich product of D3 and the Opposed Patent is the disclosure of the specific nature of the polyisobutylene and the alkylation conditions for the preparation of an alkylated phenol i.e. the polyisobutene having more than 70 mol% of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below 50 °C in the presence of an alkylation catalyst. Document D4 provides the relevant information relating the alkylation as claimed by the Opposed Patent.

16. D4 discloses (in the abstract, column 2, lines 10 to 17; lines 37 to 43; and claim 1) a process for the preparation of polyisobutyl hydroxyaromatic compounds which comprises alkylating a hydroxyaromatic compound with a polyisobutyl alkyl group with a number average molecular weight of 300 to 5000 in the presence of an acidic catalyst. The polyisobutyl alkyl group contains at least 70% of a methylvinylidene isomer. Example 1 and 2 further disclose a reaction temperature from 22-27 °C and the use of a boron trifluoride etherate alkylation catalyst (column 3, line 60 to column 4, line 26). The polyisobutylene employed in the alkylation is Ultravis®10 with a number average molecular weight of 950 and a methylvinylidene content of 76%; and Ultravis®30 with a number average molecular weight of 1300 and a methylvinylidene content of 74% (column 4, lines 27 to 35). D4 does not teach making the Mannich product.

17. However, a person skilled in the art would be motivated with a reasonable expectation of success to combine D3 and D4. Further there is no prejudice in the art against trying such a combination. The reason there is no prejudice against trying the combination is because it would have occurred to a person skilled in the art to replace the alkyl-substituted hydroxyaromatic compound of D3 with the hydroxyaromatic compound of D4 because there is a trend to do that. Both are alkylated phenols. Hence both would react with an amine and formaldehyde in the same way to produce a Mannich product. Further a person skilled in the art would be motivated to combine

D3 and D4 because D4 teaches using a polyisobutylene-substituted phenol, where the polyisobutylene has at least 70 % of vinylidene double bonds. The product of D4 then has improved properties (see D4, column 2, lines 18 to 27). D4 also teaches that the polyisobutylene-substituted phenol prepared with polyisobutylene has at least 70 % of vinylidene double bonds has improved properties over polyisobutylene with less than 70 % of vinylidene double bonds (see D4, column 2, lines 28 to 33). Hence the only difference between the alkylated phenols of D3 and D4 is the D4 product is prepared from a polyisobutylene with at least 70 % of a methylvinylidene isomer, thus making it more reactive. Therefore a person skilled in the art would have contemplated the alternative of replacing an alkylated phenol of D3 with a more reactive equivalent from D4. The alternative would have occurred to a person skilled in the art since he would only have had to exchange the alkylated phenol of D3 with the hydroxyaromatic compound of D4. Further routine experimentation would have established an improved detergent effect with a comparatively narrow molecular weight distribution as stated objectives of the Opposed Patent. Hence substituting the hydroxyaromatic compound disclosed in D4 with that used to make the Mannich of D3 would produce the claimed invention of the Opposed Patent. Therefore, claim 1 of the Opposed Patent lacks inventive step over the combination of D3 with D4.

18. In the alternative claim 1 of the Opposed Patent lacks inventive step over the combination of D3 with D4. A person skilled in the art of the alkylation of phenol with polyisobutene knows that the alkylation step is carried out below 50 °C irrespective of the mol % of vinylidene double bonds present in the polyisobutene. This is demonstrated by comparing the experimental conditions disclosed in D4 and D5.

19. As stated above, D4 discloses reaction conditions below 50 °C in the presence of an alkylation catalyst. Specifically D4 discloses the reaction conditions to be a reaction temperature from 22-27 °C and the use of a boron trifluoride etherate alkylation catalyst (column 3, line 60 to column 4, line 26).

20. D5 is a pilot plant report on the production of a product sold commercially since 1956. On page 2 of D5, the alkylation step is described and the reaction temperature varies from 120 °F in the presence of an alkylation catalyst. These

conditions meet the limitation of step a) of the Opposed patent and are similar to those disclosed in D4.

21. Therefore a person skilled in the art would have common general knowledge that alkylation of phenol with polyisobutene containing any amount of vinylidene is carried out below 50 °C in the presence of an alkylation catalyst.

22. A person skilled in the art would use knowledge of the reaction conditions given in D4 and/or D5 for the preparation of a polyisobutene substituted phenol as defined in step a) of the Opposed Patent. A person skilled in the art with mere routine experimentation would only have to substitute the polyisobutene of D4 with that used to prepare the alkyl-substituted hydroxyaromatic compound of D3. Hence the substitution discussed above would produce the claimed invention of the Opposed Patent. Therefore, claim 1 of the Opposed Patent lacks inventive step over the combination of D3 and D4.

23. Claims 2 and 3 of the Opposed Patent lack inventive step over the combination of D3 with D4 because the particularly preferred list of amines in D3 specifically disclose dimethylamine, dimethylaminopropylamine as suitable amines. Both amines are named in claim 2 of the Opposed Patent. Furthermore dimethylamine is generically a di-C₁-C₈-alkylamine as is claimed in claim 3 of the Opposed Patent.

24. Claim 4 of the Opposed Patent lacks inventive step over the combination of D3 with D4 because the Mannich reaction product using the Ultravis®10 polybutene of D4 inherently comprises at least 40 mol % of compounds of formula 1a.

25. Claim 5 of the Opposed Patent lacks inventive step over the combination of D3 with D4 because the Mannich reaction product inherently has a polydispersity between 1.1 and 3.5. The product will inherently have a polydispersity between 1.1 and 3.5 because the Ultravis®10 polybutene of D4 has a polydispersity typically less than 1.6 (see D2 for confirmation).

26. Claim 6 of the Opposed Patent lacks inventive step over the combination of D3 with D4 because person skilled in the art having knowledge of preparing the adduct as described in D9 would be able to carry out the process using mere routine experimentation.

27. Claims 7 and 8 of the Opposed Patent lack inventive step over the combination of D3 with D4 because a person skilled in the art having knowledge of column chromatography would be able to carry out the process using mere routine experimentation.

28. Claim 9 of the Opposed Patent lacks inventive step over the combination of D3 with D4 because (i) the Ultravis®10 of D4 is more reactive and hence will produce a greater yield of reacted product. Therefore the product formed by the combination of D3 with D4 will inherently have less than 20 mol % or 1 to 15 mol % of unreacted polyisobutenylphenols.

29. Claim 10 of the Opposed Patent lacks inventive step over the combination of D3 with D4 for the same reasons set forth in the arguments of paragraphs 13 to 22.

30. Claim 11 of the Opposed Patent lacks inventive step over the combination of D3 with D4 because D3 discloses on page 1, lines 5 to 18 discloses fuel compositions.

31. Claim 12 of the Opposed Patent lacks inventive step over the combination of D3 with D4 because D3 discloses a treat rate of the Mannich of 75 ppmw to 450 ppmw in a fuel. However, D3 does not disclose the amount of the Mannich product. Although not claimed, the Opposed Patent discloses on page 14, paragraph 108 that fuel compositions include 10 to 5000 or 50 to 2000 ppm by weight of the Mannich. The Opposed Patent teaches the fuel compositions contain 10 to 5000 or 50 to 2000 ppm by weight of the Mannich product; and claim 12 claims an additive concentrate contains 0.1 to 99.9% by weight, or 0.5 to 80% by weight of the Mannich product. Based on the above, a person skilled in the art would know from common general knowledge that the Mannich product of D3 is being treated in amounts within the ranges disclosed in the Opposed Patent. Further a person skilled in the art would know from common general knowledge, the Mannich of D3 may also be prepared as

a concentrate and/or as in fully formulated fuel composition. Consequently, the amount of the Mannich product of D3 present in a concentrate will inherently be within the range claimed in claim 12 of the Opposed Patent. Therefore a person skilled in the art would produce an additive composition containing the Mannich product in the form of a concentrate using mere routine experimentation.

32. Claim 13 of the Opposed Patent lacks inventive step over the combination of D3 with D4 because the Mannich product of D3 is described as a detergent on page 2, lines 4 to 25.

33. Claim 14 of the Opposed Patent lacks inventive step over the combination of D3 with D4 because a person skilled in the art would know that a Mannich reaction product soluble in a fuel composition would be soluble in a lubricant composition using mere routine experimentation.

34. Claim 15 of the Opposed Patent lacks inventive step over the combination of D3 with D4 for the same reasons set forth in the arguments of paragraph 13 to 21 for the Mannich product. Furthermore D3 discloses in various pages (e.g. page 1, line 1, page 5, line 20 and page 6, lines 15 to 20) that the Mannich product is suitable for gasoline fuel compositions.

D3 used in combination with D6 or with D7

35. In the alternative claims 1 to 15 of the Opposed Patent lack an inventive step in view of D3 used in combination with D6 or with D7.

36. As stated in paragraphs 13 to 15 above, D3 discloses a Mannich product containing all of the claimed elements of the Opposed Patent, except the nature of the alkylated group on the hydroxyl-aromatic compound and the conditions of the alkylation step are not disclosed. A person skilled in the art would be motivated with a reasonable expectation of success to combine D3 with D6 or with D7. Further there is no prejudice in the art against trying such a combination. Therefore a person skilled in the art would combine the teachings of D3 with D6 or with D7.

37. D6 and/or D7 discloses a polybutene called Ultravis® (see D2 for description) and as stated in D2 the vinylidene content of Ultravis® products is above 70 mol %. The increased mol % of vinylidene in the Ultravis® range has the advantage that it contains more reactive double bonds which produces increased reactivity. Therefore the increased reactivity means that when the Ultravis® products are used to make additives, a person skilled in the art expects increased conversions and yields. Additionally, Ultravis® products have a narrow molecular weight distribution. Consequently, increased yields and conversions resulting in fewer undesirable products coupled with the narrow molecular weight distribution would result in a product made from Ultravis® polybutene would meet the objectives of the Opposed Patent.

38. Furthermore D6 discloses the major market for Ultravis® is the petroleum additive industry (D7 discloses the same except, fuel additives are exemplified). Therefore a person skilled in the art would have contemplated the alternative of replacing an alkylated phenol of D3 with a more reactive equivalent derived from a polybutene of D6 and/or D7. The alternative would have occurred to a person skilled in the art since he would only have had to exchange the Ultravis® polybutene for the equivalent material of D3. Further routine experimentation would have established that improved detergent effect with a comparatively narrow molecular weight distribution as stated objectives of the Opposed Patent. Hence substituting Ultravis® polybutene disclosed in D6 and/or D7 for the polybutene used to make the Mannich of D3 would produce the claimed invention of the Opposed Patent. Therefore, claim 1 of the Opposed Patent lacks inventive step over the combination of D3 with D6 or with D7.

39. Claim 2 of the Opposed Patent lacks inventive step over the combination of D3 with D6 or D7 because the particularly preferred list of amines specifically discloses dimethylamine, dimethylaminopropylamine as suitable amines. Both amines are named in claim 2 of the Opposed Patent.

40. Claim 3 of the Opposed Patent lacks inventive step over the combination of D3 with D6 or D7 because dimethylamine is named as a suitable amine. Generically

dimethylamine is a di-C₁-C₈-alkylamine. Claim 3 of the opposed Patent explicitly names a suitable amine as di-C₁-C₈-alkylamine.

41. Claim 4 of the Opposed Patent lacks inventive step over the combination of D3 with D6 or D7 because the Mannich reaction product using the Ultravis®10 polybutene of D6 (and/or D7) inherently comprises at least 40 mol % of compounds of formula 1a.
42. Claim 5 of the Opposed Patent lacks inventive step over the combination of D3 with D6 or D7 because the Mannich reaction product inherently has a polydispersity between 1.1 and 3.5. The product will inherently have a polydispersity between 1.1 and 3.5 because the Ultravis®10 polybutene of D6 (and/or D7) has a polydispersity typically less than 1.6 (see D2 for confirmation).
43. Claim 6 of the Opposed Patent lacks inventive step over the combination of D3 with D6 or D7 because person skilled in the art having knowledge of preparing the adduct as described in D9 would be able to carry out the process using mere routine experimentation.
44. Claims 7 and 8 of the Opposed Patent lack inventive step over the combination of D3 with D6 or D7 because a person skilled in the art having knowledge of column chromatography would be able to carry out the process using mere routine experimentation.
45. Claim 9 of the Opposed Patent lacks inventive step over the combination of D3 with D6 or D7 because (i) the Ultravis®10 of D6 (and/or D7) is more reactive and hence will produce a greater yield of reacted product. Therefore the product formed by the combination of D3 with D6 or D7 will inherently have less than 20 mol % or 1 to 15 mol % of unreacted polyisobutenylphenols.
46. Claims 10-15 of the Opposed Patent lacks inventive step over the combination of D3 with D6 or D7 for the same reasons set forth in the arguments of paragraphs 29 to 34 relating to disclosures in D3.

D8 used in combination with D9

47. In the alternative claims 1 to 2 and claims 4 to 9 of the Opposed Patent lack an inventive step in view of D8 used in combination with D9.

48. Document D8 (EP 0 831 141) discloses in Examples 1 to 3 a Mannich product prepared from a highly reactive polyisobutylene (Ultravis®10, see D2 for detailed information), prepared with the alkylation step at a temperature of 22-27 °C in the presence of boron trifluoride etherate as an alkylation catalyst (see Example 1). The product of Example 1, then reacted with paraformaldehyde and an amine (Examples 2 and 3). The amine of Example 3 is DMAPA, which contains a primary amine functional group. D8 does not teach the production of the adduct as defined in claim 1 of the Opposed Patent.

49. However, Document D9 (Principles of Organic Chemistry), in section 8.6 (page 261 to 264) discusses the Mannich reaction including a mechanism containing an adduct as defined in claim 1 of the Opposed Patent. The mechanism (a) on page 261 teaches the carrying out the Mannich reaction by first forming an adduct of an aldehyde (e.g. formaldehyde) with an amine containing a primary or secondary amine functional group. Furthermore, D9 teaches on page 262 typical reactions used to prepare a Mannich product. The examples explicitly teach using formaldehyde, dimethylamine (an amine with a secondary amine functional group) and a compound capable of undergoing enolization. The compounds listed as capable of undergoing enolization include phenols (illustrated on page 263).

50. A person skilled in the art would be motivated with a reasonable expectation of success to combine D8 with D9. Further there is no prejudice in the art against trying such a combination. A person skilled in the art having the knowledge of D9 (i.e. initially making an adduct of an aldehyde and an amine) would modify with mere routine experimentation Example 3 of D8 thus preparing an adduct. The adduct would then be reacted with the polyisobutylene-substituted phenol. The resultant Mannich product from the combination of D8 with D9 meets the limitation of claim 1 of the Opposed Patent. Therefore, claim 1 of the Opposed Patent lacks inventive step over the combination of D8 with D9.

51. Claim 2 of the Opposed Patent lacks inventive step over the combination of D8 with D9 because the amine used in Example 3 of D8 is dimethylaminopropylamine and this is explicitly named as a suitable amine in claim 2 of the Opposed Patent.

52. Claim 4 of the Opposed Patent lacks inventive step over the combination of D8 with D9 because the Mannich reaction product inherently comprises at least 40 mol % of compounds of formula 1a.

53. Claim 5 of the Opposed Patent lacks inventive step over the combination of D8 with D9 because the Mannich reaction product inherently has a polydispersity between 1.1 and 3.5. The product will inherently have a polydispersity between 1.1 and 3.5 because the Ultravis®10 polybutene of D8 has a polydispersity typically less than 1.6 (see D2 for confirmation).

54. Claim 6 of the Opposed Patent lacks inventive step over the combination of D8 with D9 because person skilled in the art having knowledge of preparing the adduct as described in D9 would be able to carry out the process using mere routine experimentation.

55. Claims 7 and 8 of the Opposed Patent lack inventive step over the combination of D8 with D9 because a person skilled in the art having knowledge of column chromatography would be able to carry out the process using mere routine experimentation.

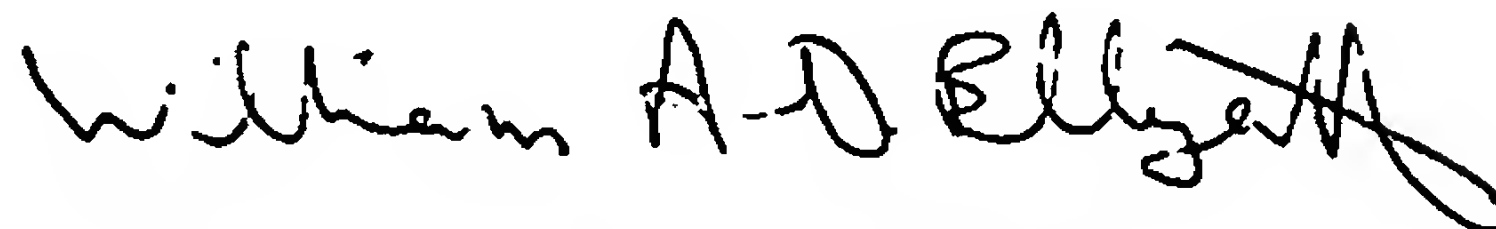
56. Claim 9 of the Opposed Patent lacks inventive step over the combination of D8 with D9 because (i) the Ultravis®10 is more reactive and hence will produce a greater yield of reacted product. Therefore the product formed by the combination of D8 with D9 will inherently have less than 20 mol % or 1 to 15 mol % of unreacted polyisobutenylphenols.

IV - Other Requests

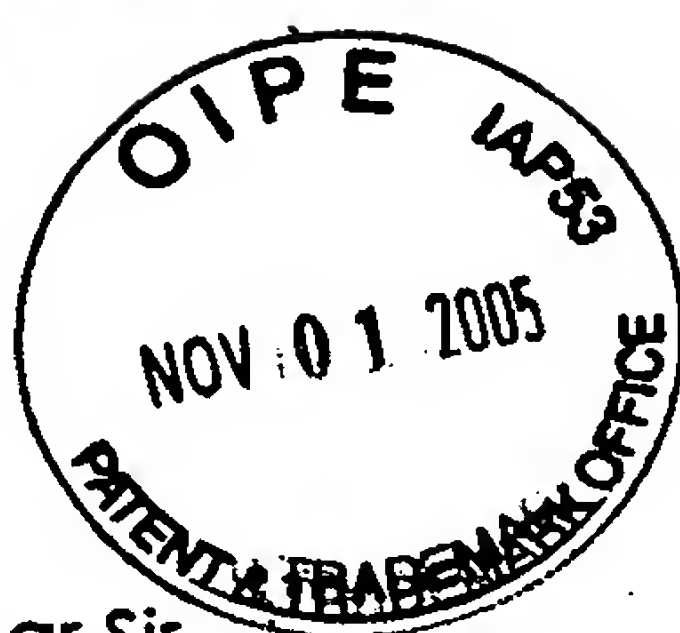
In view of the above comments, the Opponent requests:

1. that the Opposed Patent be revoked in its entirety; and
2. oral proceedings in the event that the Opposed Patent is not revoked in its entirety based on written submissions.

The Opponent
Lubrizol Limited

A handwritten signature in black ink, appearing to read "William A.T. Ellyatt", with a stylized flourish at the end.

William A.T. Ellyatt (GA46412)



12 November 2004

Dear Sir,

Opposition by Lubrizol Limited to EP 1 233 990 B1**(Application Number 00969422.5)****Our Reference: LO 234**

I enclose EPO Forms 2300 and 1010 in respect of Lubrizol Limited filing a notice of opposition against the above granted patent.

With respect to the 2300 form, in Section IX, I have marked all evidence as being enclosed. In the faxed copy I have only provided copies of references D1 to D6 and D31. However, two confirmation copies are being sent by courier and all references D1 to D31 are included therein.

The couriered confirmation copy also contains the original copy of the declaration (document D2) by John McMahon.

I am an employee of the Applicant, Lubrizol Limited, and hereby appoint myself as the representative. I have already been authorised to act for Lubrizol Limited under authorisation no. 46412.

Payment of the opposition fee will be made by The Lubrizol Corporation via their deposit account with the European Patent Office.

**Responsible Care****Lubrizol Limited**

The Knowle, Nether Lane, Hazelwood, Derbyshire DE56 4AN
Telephone: +44 (0) 1332.842.211 Facsimile: +44 (0) 1332.842.303

Postal address

PO Box 88, Belper, Derby DE56 1QN
www.lubrizol.com



Fluid technologies for a better world™

I trust that this is in order, but if you have any queries, please contact me immediately.

Yours faithfully

LUBRIZOL LIMITED

William A. T. Ellyatt

William A. T. Ellyatt
(GA 46412)

Enc. EPO Form 2300
EPO Form 1010
Facts and Arguments in Support of the Opposition
Original copy of the declaration by John McMahon



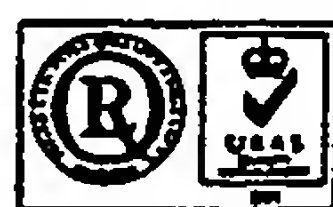
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EPO - Munich
52
16. Nov. 2004

*Original Copy of the Declaration
from John McMahon (Document D2)
William A. T. Ellyatt*

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EP 1 233 990 B1 (Application Number 00969422.5)

Proprietor: BASF Aktiengesellschaft

Opposition by Lubrizol Limited

Our Reference: LO 234

Facts and Arguments in Support of the Opposition

I - The Claims of the Granted Patent

1. A process for the preparation of polyisobutenylphenol-containing Mannich adducts by

a) alkylation of a phenol with highly reactive polyisobutene having a number average molecular weight of less than 1000 and a polydispersity of less than 3.0 at below about 50°C in the presence of an alkylation catalyst;

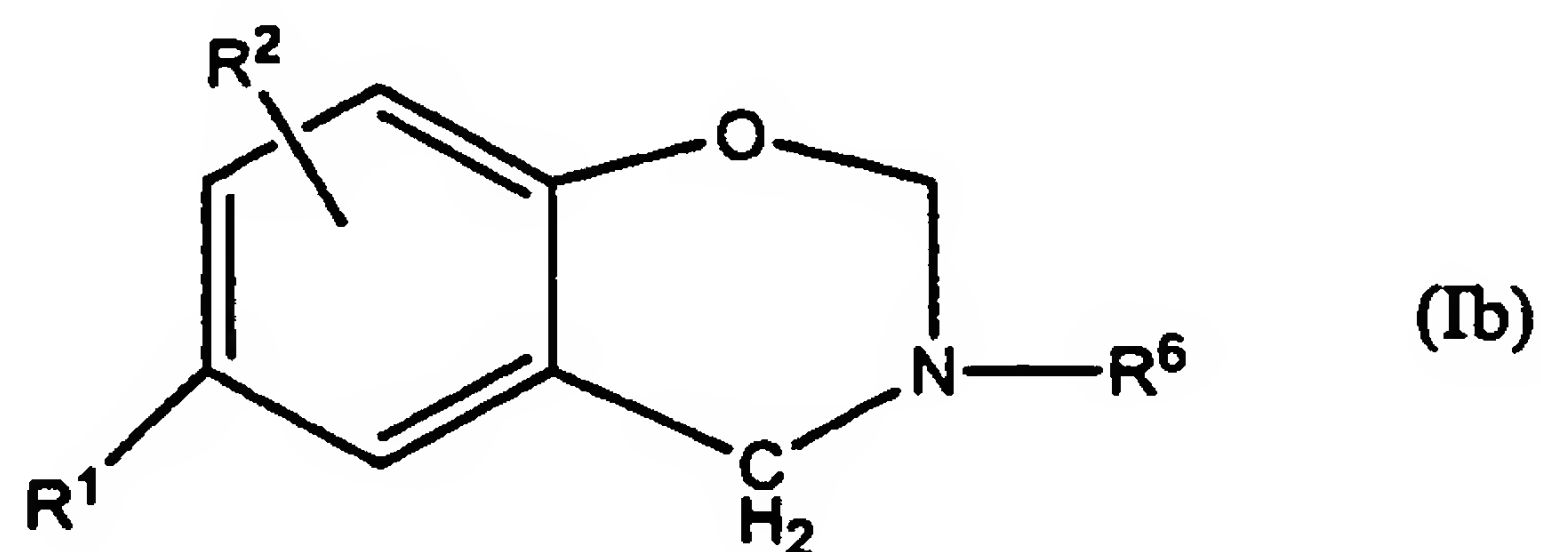
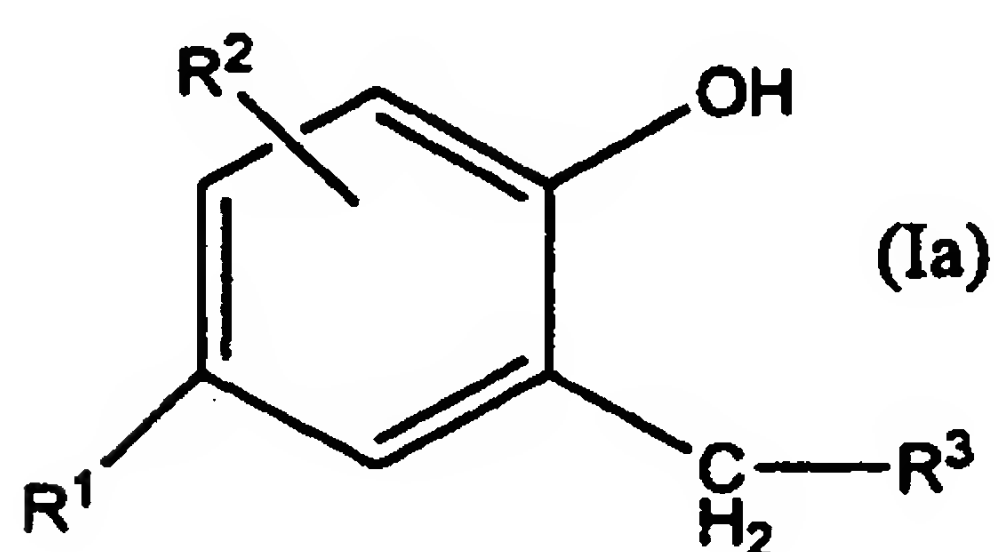
b) reaction of the reaction product from a) with

b1) an aldehyde chosen from formaldehyde, an oligomer and a polymer of formaldehyde and

b2) at least one amine which has at least one primary or at least one secondary amino function.

2. A process as claimed in claim 1, wherein the amine used is 3-(dimethylamino)-n-propylamine, di(3-(dimethylamino)-n-propyl]amine, dimethylamine, diethylamine or morpholine.

3. A process as claimed in either of claims 1 and 2, wherein an adduct mixture is obtained which comprises at least 40 mol % of compounds of the formula Ia and/or Ib,



where

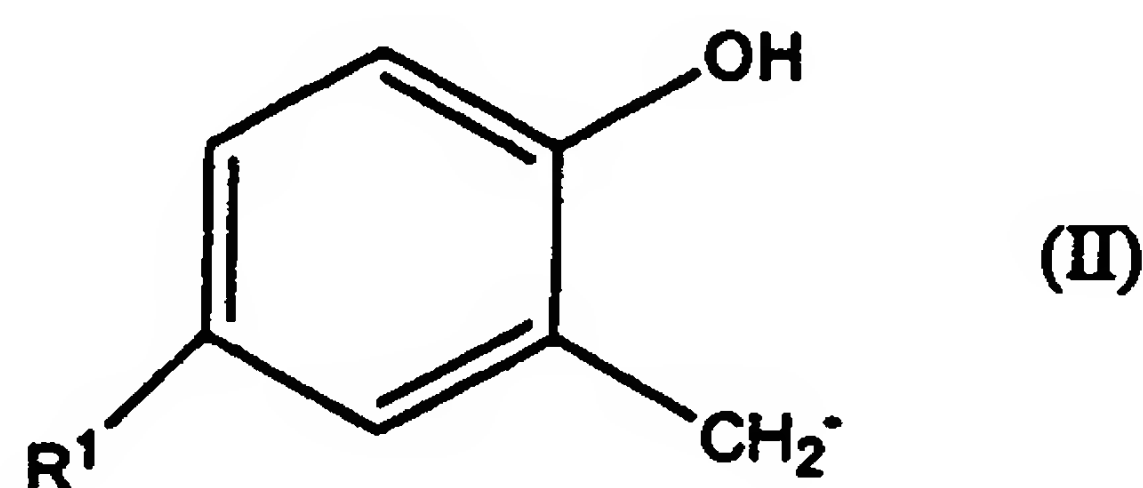
R^1 is a terminally bonded polyisobutenyl radical,

R^2 is H, C_1 - to C_{20} -alkyl, C_1 - to C_{20} -alkoxy, hydroxyl, a polyalkylenyl radical or $CH_2NR^4R^5$, where R^4 and R^5 have the meanings stated below, and

R^3 is NR^4R^5 , where R^4 and R^5 , independently of one another, are selected from H, C_1 - to C_{20} -alkyl, C_3 - to C_8 -cycloalkyl and C_1 - to C_{20} -alkoxy radicals

which may be interrupted and/or substituted by heteroatoms selected from

N and O, and phenol radicals of the formula II



where R^1 and R^2 are as defined above;

with the proviso that R^4 and R^5 are not simultaneously H or phenol radicals of the formula II; or R^4 and R^5 , together with the N atom to which they are bonded, form a 5-, 6- or 7-membered cyclic structure which has one or two heteroatoms selected from N and O and may be substituted by one, two or three C^1 - to C^6 -alkyl radicals; and

R^6 is a radical R^4 or R^5 other than H.

4. A process as claimed in any of the preceding claims, wherein an adduct having a polydispersity of from 1.1 to 3.5 is obtained.

5. A process as claimed in any of the preceding claims, wherein R^1 has a number average molecular weight of from 300 to 850.

6. A process as claimed in any of claims 1 to 5, wherein the reaction mixture from b) is fractionated by column chromatography over an acidic stationary phase by multistage elution with

- at least one hydrocarbon and then

- at least one basic alcohol/water mixture.

7. A process as claimed in claim 6, wherein the basic alcohol/water mixture used is a mixture of

- a) from 75 to 99.5% by weight of at least one C₂- to C⁴-alcohol,
- b) from 0.4 to 24.4% by weight of water and
- c) from 0.1 to 15% by weight of at least one amine which is volatile at room temperature.

8. A process as claimed in any of the preceding claims, wherein the adduct mixture obtained includes from 0 to 20 mol%, preferably 1 to 15 mol%, of polyisobutenylphenols from reaction step a) which have not been further reacted.

9. A Mannich adduct obtainable by a process as claimed in any of claims 1 to 8.

10. A Mannich adduct obtainable by the process as claimed in claim 3, which comprises at least 40 mol% of compounds of the formula Ia and/or Ib.

11. The use of a Mannich adduct as claimed in claim 9 or 10 as a detergent additive in fuel and lubricant compositions.

12. An additive concentrate containing, in addition to conventional additive components, at least one Mannich adduct as claimed in claim 9 or 10 in amounts of from 0.1 to 99.9% by weight, preferably 0.5 to 80% by weight.

13. A fuel composition containing a main amount of a liquid hydrocarbon fuel and an amount, having detergent activity, of at least one adduct as claimed in claim 9 or 10.

14. A lubricant composition containing a main amount of a liquid, semisolid or solid lubricant and an amount, having detergent activity, of at least one adduct as claimed in claim 9 or 10.

15. The use of a fuel composition as claimed in claim 13 as a gasoline or diesel fuel.

Grounds for Opposition According to Article 100a EPC

II - Lack of Novelty (Article 54 EPC)

3. The priority date of the Opposed Patent is 6th October 1999.
4. The process of claims 1-4 and 8, the Mannich adduct of claims 9 to 10, the compositions of claims 12 to 13 and the use of Mannich of claims 11 and 15 lack novelty over state of the art at the priority date of the Opposed Patent.
5. Claim 1 of the Opposed Patent is anticipated by D1 (EP 831 141 A1, published on 25th March 1998). D1 discloses in Examples 1 to 3 (page 3, lines 30 to 57) a polyisobutylene-substituted phenol Mannich product within the scope of claims 1 to 4 and 8 to 15. Example 1 discloses the alkylation of phenol with a highly reactive polyisobutene at a temperature of 22 °C to 27 °C in the presence of an alkylation catalyst (boron trifluoride etherate). The polyisobutylene disclosed is Ultravis®10 commercially available from BP. Examples 2 and 3 further disclose the reaction of the product of Example 1 with paraformaldehyde and ethylene diamine in Example 2 and with dimethylaminopropylamine (DMAPA) in Example 3. The amines disclosed in Examples 2 and/or 3 have at least one primary or at least one secondary amino function.
6. The Opponent recognises that Example 1 states that Ultravis®10 has a Mw of 1000. However, the molecular weight disclosed is incorrect. A person skilled in the art would recognise that the number average molecular weight is actually around 930. In addition the other inherent characteristics of Ultravis®10 are that it typically has a vinylidene content of 70% with a polydispersity of 1.6. These facts are confirmed in D2 (a declaration with accompanying GPC analysis from John McMahon an employee of BP Chemicals who is the manufacturer and supplier of Ultravis®10). Furthermore document D3 (US 5,300,701, published on 5th April 1994) also confirms

a number average molecular weight of less than 1000 with a vinylidene content of about 76 % (column 3, lines 6 to 13 and column 4, lines 29-31). Other references disclosing the number average molecular weight and vinylidene content of Ultravis®10 are presented in D7 to D28. The number average molecular weight of Ultravis®10 is quoted as being 950 and with a vinylidene content of 70 % or higher.

7. Claim 2 of the Opposed Patent is anticipated by D1 because the amines disclosed in Examples 2 to 5 contain at least one secondary or primary amino group including dimethylaminopropylamine (DMAPA). Therefore, D1 discloses the subject matter of claim 3 of the Opposed Patent.

8. Claim 3 of the Opposed Patent is anticipated by D1 because the adduct disclosed is obtained by a Mannich reaction using a compound defined in formula (Ia) wherein R¹ is a terminally bonded polyisobutenyl radical. Since the high reactive polyisobutylene of D1 contains as least 70 % of terminal olefinic double bonds (page 2, lines 35 to 36) and these predominately react at the para position relative to the hydroxyl group of phenol D1 inherently has the same adduct. Furthermore Example 1 states that the polyisobutylene-substituted phenol has a ratio of para to ortho of 3:1 (page 3, lines 40 to 41). Therefore, D1 discloses the subject matter of claim 3 of the Opposed Patent.

9. Claim 4 of the Opposed Patent is anticipated by D1 because the polydispersity of Ultravis®10 is less than 1.8 and typically 1.6 (confirmed in D2). Therefore, D1 discloses the subject matter of claim 4 of the Opposed Patent.

10. Claim 8 of the Opposed Patent is anticipated by D1 because Example 1 discloses the alkylation of Ultravis®10 and as it is derived from isobutylene containing 70 % of terminal olefinic double bonds it will inherently have less than 20 mol % polyisobutenylphenols which have not been further reacted. The reason for this is because the Ultravis®10 intrinsically has the same properties as that disclosed in Claim 1 of the Opposed Patent and in paragraphs 5 and 7 above. Therefore, D1 discloses the subject matter of claim 8 of the Opposed Patent.

11. Claim 9 of the Opposed Patent is anticipated by D1 because of the arguments set forth in paragraphs 5 to 10. Therefore, D1 discloses the subject matter of claim 9 of the Opposed Patent.
12. Claim 10 of the Opposed Patent is anticipated by D1 because of the arguments set forth in paragraph 8.
13. Claim 11 of the Opposed Patent is anticipated by D1 because the Mannich reaction product of Examples 2 and 3 are used as a detergent in a fuel application including gasoline and diesel. Furthermore, D1 on page 3, lines 6 to 11 states the Mannich product is used in a diesel fuel. Additionally, D1 discloses in tests A to D on page 4, line 15 to page 5, line 53 the use of the Mannich product in a gasoline fuel (Tests A to C) and a diesel fuel (Test D) test. Therefore, D1 discloses the subject matter of claim 11 of the Opposed Patent.
14. Claim 12 of the Opposed Patent is anticipated by D1 because the Mannich reaction product is employed as part of an additive package, with the Mannich reaction product present at 17 % by weight (page 4, lines 20 to 25). The amount of the Mannich reaction product falls within the claimed range of the Opposed Patent because the additive package is dosed at a rate of 800 ml/m³. Furthermore a person skilled in the art will appreciate that the additive package as defined on page 4 is in the form of a concentrate. Therefore, D1 discloses the subject matter of claim 12 of the Opposed Patent.
15. Claim 13 of the Opposed Patent is anticipated by D1 because the Mannich reaction product has detergent activity in a fuel as is demonstrated by Tests A to D on page 4, line 15 to page 5, line 53. Therefore, D1 discloses the subject matter of claim 13 of the Opposed Patent.
16. Claim 15 of the Opposed Patent is anticipated by D1 due to the same arguments presented in paragraph 13. Therefore, D1 discloses the subject matter of claim 15 of the Opposed Patent.

17. In summary D1 clearly discloses in Examples 1 to 3 a polyisobutenylphenol-containing Mannich within the scope of claims 1 to 4 and 8 because the highly reactive polyisobutene of D1 meets the parameters of component (a) of the Opposed Patent and the alkylation is conducted within the claimed conditions. Furthermore, D1 discloses in Examples 2 and/or 3, components (b1) and (b2) of the Opposed Patent. Finally the disclosure on page 2, line 47 to page 3, line 11 discloses the use of the Mannich product in a gasoline and/or diesel fuel as a detergent within the scope of claims 9 to 15 of the Opposed Patent. Therefore, D1 discloses the subject matter of claims of claims 1-4 and 8-13 and 15 of the Opposed Patent.

18. Document D4 (EP1194512, also published as WO 00/78898, priority date of 22nd June 1999 and published 28th December 2000) is a novelty destroying reference under Article 54(3) EPC for claims 1-4, 8 to 13 and 15. Hence, the Opposed Patent lacks novelty over D4.

19. D4 discloses an aromatic Mannich compound derived from a hydroxyl containing hydrocarbyl substituted aromatic compound, an aldehyde and an amine containing at least one primary or secondary amino group (pages 1 to 2 in the Summary of invention and page 13, claim 1).

20. Claim 1 of the Opposed Patent is anticipated by D4. The hydrocarbyl substituted aromatic compound in D4 is described as being a polyisobutylene with a molecular weight of 200 to 5000, preferably 750 to 1500 and having a methylvinylidene isomer content of at least 70 % (on page 4, last paragraph to page 5 paragraph 3). On page 5, lines 1 to 3, Ultravis®10 is named as an example of a suitable polyisobutylene with a number average molecular weight of 950 and a methylvinylidene content of about 82 %. D4 discloses in Example Part A and Part B (page 11), preparing a Mannich compound using Ultravis®10, paraformaldehyde, ethylene diamine and a reaction temperature of 22 °C to 27 °C in the presence of an alkylation catalyst boron trifluoride etherate. The polydispersity of Ultravis®10 is confirmed in D2 as being 1.6. The amine, the aldehyde and the alkylation of phenol; the polydispersity and number average molecular weight of the polyisobutene; and the alkylation temperature all fall within the scope of claim 1 of the Opposed Patent. Therefore, D4 anticipates claim 1 of the Opposed Patent.

21. Claim 2 of the Opposed Patent is anticipated by D4 due the disclosure on page 6, from formula C-1 onwards. Page 6 specifically discloses suitable amines to include dimethylamine (7th last line) or morpholine (4th last line). Therefore, D4 anticipates claim 2 of the Opposed Patent.
22. Claim 3 of the Opposed Patent is anticipated by D4 for the same reasons set forth in the arguments of paragraph 8. The relevant portion of text in D4 is on page 11, Example Part A.
23. Claim 4 of the Opposed Patent is anticipated by D4 for the same reasons set forth in the arguments of paragraph 9 above.
24. Claim 5 of the Opposed Patent is anticipated by D4 due the disclosure on page 5, paragraphs 2 and 3 relating to number average molecular weight of 300 to 2500.
25. Claim 8 of the Opposed Patent is anticipated by D4 for the same reasons set forth in the arguments of paragraph 10 above.
26. Claim 9 of the Opposed Patent is anticipated by D4 for the same reasons set forth in the arguments of paragraph 10 above.
27. Claim 10 of the Opposed Patent is anticipated by D4 for the same reasons set forth in the arguments of paragraph 22 above.
28. Claim 11 of the Opposed Patent is anticipated by D4 due to the disclosure of the Mannich in a fuel composition suitable for gasoline and/or diesel fuel where the Mannich provides detergent properties (page 9, last paragraph to page 10, second paragraph).
29. Claim 12 of the Opposed Patent is anticipated by D4 due the disclosure on page 10 2nd paragraph relating to 10 to 1000 parts by weight of Mannich per million parts of fuel.

30. Claim 13 of the Opposed Patent is anticipated by D4 due the disclosure on page 10 2nd paragraph relating enhanced detergent properties.

31. Claim 15 of the Opposed Patent is anticipated by D4 for the same reasons set forth in the arguments of paragraph 29 above and page 10 2nd paragraph also discloses the fuel as being a diesel fuel.

32. Therefore, D4 clearly discloses in the highlighted sections a polyisobutenylphenol-containing Mannich within the scope of claims 1 to 5 and 8 because the highly reactive polyisobutene of D4 meets the parameters of component (a) of the Opposed Patent and the alkylation is conducted within the claimed conditions. Furthermore, D4 discloses in the highlighted sections, components (b1) and (b2) of the Opposed Patent. Accordingly, D1 discloses the subject matter of claims of claims 1-4 and 8-13 and 15 of the Opposed Patent. Hence, the Opposed Patent lacks novelty over D4.

III - Lack of Inventive Step (Article 56 EPC)

33. In the alternative claims 1 to 15 of the present invention lack an inventive step in view of D1 used alone or in combination with D31, D3 in combination with D5 or D3 in combination with D6.

34. Claim 1 of the Opposed Patent lacks inventive step over D1. D1 discloses on page 2, line 23 to 41 a Mannich reaction product suitable as a fuel detergent derived from a polyisobutylene-substituted phenol where the polyisobutylene has at least 70 % vinylidene olefinic double bonds, an aldehyde and an amine with a primary amino functional group, specifically ethylene diamine. Further D1 discloses a polyisobutylene has a number average molecular weight of 700 to 2300 or 750 to 1500 (page 2, line 41), and gives an example using Ultravis®10 with a number average molecular weight of 930 as confirmed by D2. Therefore, a person skilled in the art would have a reasonable expectation that a Mannich reaction product with a polyisobutylene chain with a number average molecular weight of 930 would behave in a similar manner to a Mannich reaction product with a number average molecular weight polyisobutylene of 550, (examples in the Opposed Patent) 700 (examples in

the Opposed Patent and a disclosed lower range in D1) or 750 (disclosed lower range in D1) would all behave in a similar manner. Further the polydispersity of the Ultravis®10 and the polymers defined in the Opposed Patent are both less than 3.

35. Consequently, a person skilled in the art would be aware that the two different polymers (Ultravis®10 disclosed in D1 and the polymers explicitly defined and used in the Opposed Patent) have a relatively small difference in their number average molecular weight and have similar polydispersity i.e. both less than 3. Therefore, a substantial portion of the Mannich reaction product will be of equal molecular weight and therefore equally soluble in fuel and would behave in a similar manner in a fuel. Therefore, a person skilled in the art would expect the performance to be similar. Hence, any differences between D1 and the Opposed Patent therefore represent mere routine experimentation.

36. Claim 2 of the Opposed Patent lacks inventive step over D1 for the same reasons set forth in the arguments of paragraph 7. If the Examiners find the amines of claim 2 to be novel over D1, the Opponent further contends that the Opposed Patent lacks inventive step over the combination of D1 and D31. D31 discloses the use of other well know amines including dimethylamine (page 6, lines 9 to 10) and a person skilled in the art would select, with a reasonable expectation of success, these amines to form the Mannich reaction product.

37. Claim 3 of the Opposed Patent lacks inventive step over D1 for the same reasons set forth in the arguments of paragraph 8. If the Examiners find the compounds of claim 3 to be novel over D1, the Opponent further contends that the Opposed Patent lacks inventive step over D1 because the Mannich reaction product inherently comprises at least 40 mol % of compounds of formula 1a.

38. Claim 4 of the Opposed Patent lacks inventive step over D1 for the same reasons set forth in the arguments of paragraph 9. If the Examiners find the polydispersity of claim 4 to be novel over D1, the Opponent further contends that the Opposed Patent lacks inventive step over D1 because the Mannich reaction product inherently has a polydispersity between 1.1 and 3.5.

39. Claim 5 of the Opposed Patent lacks inventive step over D1 for the same reasons set forth in the arguments of paragraphs 34 and 35 relating to number average molecular weight.
40. Claims 6 and 7 of the Opposed Patent lack inventive step over D1 because a person skilled in the art having knowledge of column chromatography would be able to carry out the process using mere routine experimentation.
41. Claim 8 of the Opposed Patent lacks inventive step over D1 because the Mannich reaction product inherently has less than 20 mol % of unreacted polyisobutenylphenols.
42. Claim 9 of the Opposed Patent lacks inventive step over D1 for the same reasons set forth in the arguments of paragraphs 34 to 41 respectively.
43. Claim 10 of the Opposed Patent lacks inventive step over D1 for the same reasons set forth in the arguments of paragraph 37.
44. Claims 11 to 13 of the Opposed Patent lacks inventive step over D1 because the Mannich product has detergent activity in a fuel. Furthermore, a person skilled in the art will appreciate that the Mannich product may be in the form of a concentrate or produced in the form of a concentrate using mere routine experimentation.
45. Claim 14 of the Opposed Patent lacks inventive step over D1 because a person skilled in the art would know that a Mannich reaction product soluble in a fuel composition would be soluble in a lubricant composition using mere routine experimentation.
46. Claim 15 of the Opposed Patent lacks inventive step over D1 for the same reasons set forth in the arguments of paragraph 44.
47. In summary claims 1 to 15 of the Opposed Patent lack inventive step in view of D1 alone or D1 in combination with D31.

48. Claim 1 of the Opposed Patent lacks inventive step over D3 in combination with D5. D3 discloses an alkylation process for the preparation of polyisobutyl hydroxyaromatic compounds. The polyisobutyl substituent is from polyisobutylene and has a number average molecular weight of 300 to 5000 and a methylvinylidene isomer content of at least about 70 % (column 2, lines 37 to 49 and column 3, lines 1 to 5). Examples of a suitable polyisobutylene include Ultravis®10. The alkylation temperature is in the range 0 °C to 100 °C and preferably 20 °C to 60 °C (column 3, lines 29 to 31).

49. D5 (US 5,725,612, published on 10th March 1998) discloses a Mannich condensation product of a substituted hydroxyaromatic compound having on the ring (a) a polyolefin having a number average molecular weight of 500 to 3000 or 500 to 2000 (column 3, lines 60 to 64); (b) a C1-4 alkyl; and (c) an aliphatic polyamine having only one primary or secondary amino group (see abstract) within the scope of claims 1 to 5. The Mannich product is typically prepared at a temperature of 50 °C to 200 °C.

50. The polyolefin disclosed in D5 in column 3, lines 48 to 52, is a highly reactive polybutylene having a terminal vinylidene group of preferably at least 70 %. Further the polyolefin has a number average molecular weight determined by GPC to be 500 to 2000 (column 3, lines 60 to 64) with a polydispersity of 1 to 4 and preferably 1 to 2 (column 3, lines 65-67). Additionally, the hydroxyaromatic compound is alkylated in the presence of BF₃ catalyst (column 3, lines 58 to 59). D5 further discloses in column 4, lines 9 to 65 a series of polyamines with only one primary or secondary amino group. Suitable aldehydes required for the Mannich condensation are disclosed in column 4, line 66 to column 5, line 9 including a preference for formaldehyde.

51. Claim 1 of the Opposed Patent differs from D5 description in paragraph 43 only in terms of the alkylation reaction temperature in step (a). However, due to the overlapping temperature ranges for the alkylation of phenol disclosed in D5 and D3, a person skilled in the art having knowledge of making a polyisobutyl hydroxyaromatic compound from D3 with an alkylation temperature 0 °C to 100 °C and preferably 20 °C to 60 °C would be motivated with a reasonable expectation of success to combine the alkylation process with that disclosed in D5. Moreover, there is no prejudice in

the art against trying such a combination. Further any differences between the combination of D3 and D5 represent mere routine experimentation and the Opposed Patent does not demonstrate any advantage associated with such differences. Therefore, claim 1 of the Opposed Patent lacks inventive step over the combination of D3 and D5.

52. The Opposed Patent lacks inventive step over D3 in combination with D6. The technical features of D3 are described in paragraph 48.

53. Document D6 (published on 10th December 1997) discloses on page 2, line 28 to page 3, line 21 a Mannich product with a polydispersity of 1 to 4 and preferably 1 to 2 (page 2, paragraph 12, line 32); the polybutylene on the Mannich with a number average molecular weight of 740 to 1200, and preferably 800 to 950 (page 2, paragraph 13, lines 36 to 39). Further the Mannich product used in the Examples (page 7, paragraph 39, lines 15 to 20) disclose the use of a polybutylene with a number average molecular weight of 900 and a polydispersity of 1 to 1.5. Additionally D6 discloses an amine to have one and only one primary or secondary amino group (page 2, paragraph 15, lines 45 to 46). Moreover, the aldehyde of D6 is an aliphatic aldehyde, preferably formaldehyde or formalin (page 4, paragraph 18, lines 16 to 21) and used in the examples (page 7, paragraph 39, line 23). Consequently, claim 1 of the Opposed Patent only differs from D6 because D6 discloses the alkylation reaction temperature to be 50 °C to 200 °C. However, for the same reasons set forth in the arguments of paragraph 44 a person skilled in the art would be motivated with a reasonable expectation of success to combine D3 and D6. Further there is no prejudice in the art against trying such a combination. Therefore, claim 1 of the Opposed Patent lacks inventive step over the combination of D3 and D6.

54. Claim 3 and claim 10 of the Opposed Patent lack inventive step over D3 in combination with D6 for the same reasons set forth in the arguments of paragraphs 43 and 47 above.

55. Claim 4 of the Opposed Patent lacks inventive step over D3 in combination with D6 because the polydispersity disclosed in D5 and inherently in D3 are 1 to 1.5 and 1.6 respectively.
56. Claim 5 of the Opposed Patent lacks inventive step over D3 in combination with D6 for the same reasons set forth in the arguments of paragraph 35.
57. Claims 6 and 7 of the Opposed Patent lacks inventive step over D3 in combination with D6 for the same reasons set forth in the arguments of paragraph 39.
58. Claim 8 of the Opposed Patent lacks inventive step over D3 in combination with D6 because D6 discloses in Examples 1 to 29 are all derived from a Mannich reaction product as defined in paragraph 46 above with a number average molecular weight of the polybutylene of 900, a polydispersity of 1 to 1.5 etc for examples 1 to 18 (page 7, paragraph 39, lines 15 to 20) and examples 19 to 29 on page 9, paragraph 42. The analysis of examples 1 to 18 (Table 1 on page 8) and examples 19 to 29 (Table 2 on page 10) disclose the alkylated phenol having unreacted Mannich product present at 3.83 % (example 5) to a maximum of 16.94 % (example 9). All other examples have an amount of unreacted Mannich product between these two values. Consequently, combining D3 with D6 produces a Mannich reaction product that will have an adduct with unreacted polyisobutenylphenols within the ranges claimed in claim 8 of the Opposed Patent. Therefore, claim 8 of the Opposed Patent lacks inventive step over the combination of D3 and D6.
59. Claim 9 of the Opposed Patent lacks inventive step over D3 in combination with D6 for the reasons stated in paragraphs 51 to 58.
60. Claim 11 and claim 15 of the Opposed Patent lack inventive step over D3 in combination with D6 because the technical field of D6 further teaches the Mannich base as suitable for a fuel composition and the use of examples 30 to 36 in a gasoline composition (page 11, paragraph 44 of D6).
61. Claim 12 of the Opposed Patent lacks inventive step over D3 in combination with D6 because the Mannich reaction product is in the form of a additive concentrate

(page 6, paragraph 35 of D6) and preferably present at 12 to 69 wt % or 22 to 50 wt % of the concentrate.

62. Claim 13 the Opposed Patent lacks inventive step over D3 in combination with D6 because the Mannich reaction product has detergent/dispersancy properties (page 6, paragraph 36, line 38 of D6).

63. In summary the Opposed Patent lacks inventive step over D3 in combination with D6, or D3 in combination with D5. Further any differences between the combination of D3 and D6 or D3 and D5 represent mere routine experimentation and the Opposed Patent does not demonstrate any advantage associated with such differences.

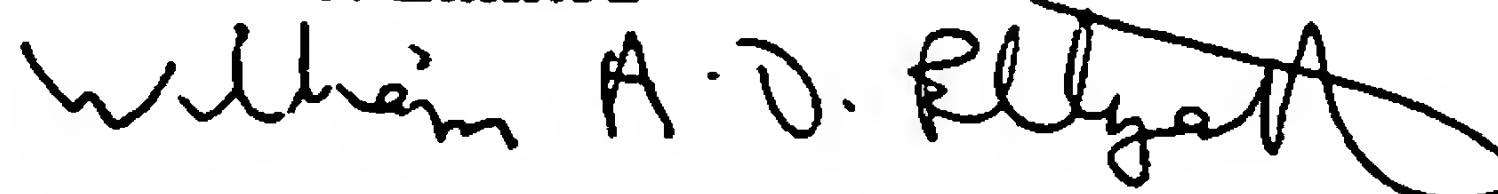
IV - Other Requests

64. In view of the above comments, the Opponent requests:

1. that the Opposed Patent be revoked in its entirety; and
2. oral proceedings in the event that the Opposed Patent is not revoked in its entirety based on written submissions.

The Opponent

Lubrizol Limited



William A.T. Ellyatt

(GA46412)



BUCKET NO: 220950US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :
ARNO LANGE, ET AL. : EXAMINER: C. TOOMER
SERIAL NO: 10/089,056 :
FILED: APRIL 3, 2002 : GROUP ART UNIT: 1714
FOR: METHOD FOR PRODUCING :
MANNICH ADDUCTS THAT CONTAIN
POLYISOBUTYLENE PHENOL

STATEMENT OF RELEVANCY

The references AT, AU, AV, AW, and AX submitted herewith are provided on a letter of opposition in EP 1226188 provided by the opponent in a letter of August 18, 2005. The EP 1226188 patent corresponds with U.S. Serial No. 10/089,064 over which some of the claims of the present application were rejected under the judicially created doctrine of obviousness-type double patenting in the Office Action of March 29, 2005.

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